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CANAIGRE TANNIN.

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Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.
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Read at the Pharmaceutical Meeting held March 21.

About four years ago, a paper by one of us in this journal (1889, p. 395) gave some account of the possibilities of canaigre becoming a valuable source of tannin. Lack of material prevented the further investigation of the tannin, until last year when a liberal supply was received from Mr. Charles B. Allaire, of Peoria, Illinois, who, as President of the Tanning Extract Company, of Deeming, New Mexico, was able to furnish samples of the roots of different ages.

It may be recalled that this canaigre is the tuberous root of *Rumex hymenosepalus*, a plant growing abundantly in the sandy soil of Texas, New Mexico and Arizona.

The roots vary much in size and appearance, according to whether they are green or dry. The accompanying illustration is from a green root, one-half natural size. It and a number of others were received September 14, 1892, from Professor C. B. Collingwood, of the University of Arizona, who furnished the following interesting information:

"It is impossible to make a satisfactory division into roots one, two and three years old from wild plants. Differences of soil, amount of water, etc., cause a wide variation in the appearance. These roots were planted in July, 1891, in our plot, which happens to be mesa soil of rather heavy gravelly loam, altogether too hard and stiff for this plant, which seems to prefer almost pure sand.

"They received some irrigation, but did not show above ground until October. During the winter they grew steadily, but slowly. About March 1, they started into rapid growth, which continued until flower and seeding occurred in April; seeds very sparingly, but more plentifully than in native state. The percentage of tannin has been steadily increasing. The roots now show signs of sprouting, and will be gathered and replanted. The yield from this plot was about seven tons to the acre, but on account of unfitness of soil



is not a fair test. Experiments on other soils indicate that we may safely expect fifteen to twenty tons of green roots per acre.

"The last samples analyzed, August 31, contained in green root 66 per cent. moisture at 100° C, 16.18 per cent. total extract, 11.46 per cent. tannic acid (by hide) 70.98 per cent. purity. This would show in the dry roots, which contain 8 per cent. moisture, 44.66 per cent. total extract, 31.62 per cent. tannic acid with 70.98 per cent. purity.

"During the spring I travelled over the Territory collecting samples. The average from fourteen widely different parts showed (in

dry root) 8 per cent. moisture, 44.7 per cent. total extract, 30.5 per cent. tannic acid, 68.23 per cent. purity.

"It is of great interest to us to know that the cultivated root is at least equal to the wild, and we see no reason why the percentage of tannin should not be increased by judicious selection."¹

Some of the green roots sent by Professor Collingwood have been growing indoors since last September and the growth has been satisfactory.

The chief object of this paper is to give the results of a more extended study of the tannin.

Preparation and Purification.—Two methods of preparation were tried, one by percolation with commercial ether, and the other by percolation with cold water. The product from the ether extraction was found to be very difficult to purify from the associated yellow coloring matter, so that water was adopted as the menstruum.

The diluted aqueous percolate was divided into two equal parts. One portion was completely precipitated with lead acetate, the other was then stirred into it, and the whole filtered, whereby a yellow filtrate was obtained. The tannin in the filtrate was removed, by agitation with acetic ether. By distilling off the latter under diminished pressure, the tannin was obtained as a porous yellow residue.

The thoroughly dried and finely powdered tannin was treated with absolute ether to remove coloring and crystalline substance. The latter was obtained in acicular crystals and was almost entirely protocathechuic acid.

The treatment with absolute ether proved quite successful in removing the coloring, but it is obvious that the absorption of moisture must be guarded against or tannin will dissolve.

The ether washed tannin was dissolved in ether containing just sufficient alcohol to effect solution, the latter was filtered and then distilled to dryness in a partial vacuum when a porous yellow residue remained. This was employed in the subsequent work on the tannin. Attempts were made to get rid of the yellow coloring matter by precipitation of the tannin with lead acetate and washing

¹ Since writing this paper, Bulletin No. 7 of the Arizona Agricultural Experiment Station has been received from Professor Collingwood. This pamphlet of 40 pages is devoted entirely to Canaigre, under five headings, as follows: (1) Historical Sketch; (2) Botanical Characteristics; (3) Chemical Examination; (4) Cultivation; (5) Conclusions.

the lead precipitate with both water and water containing lead acetate and decomposing the precipitate with hydrogen sulphide but several lots so treated were found to afford comparatively smaller quantities of tannin, not in any way superior to that obtained above.

It was noticed during the progress of the latter work, that if a solution of the tannin possessing a red color was precipitated by lead acetate and the unfiltered mixture thoroughly saturated with hydrogen sulphide, upon filtering, a much lighter colored filtrate was obtained, thus showing lead sulphide to be, under these conditions, a good decolorizing agent. Some of the original water percolate was saturated with sodium chloride, the precipitate collected by filtration, dissolved in commercial ether and the solution distilled to dryness under diminished pressure, a porous red-brown residue being obtained. It was only partly soluble in cold, but completely in hot, water.

The filtrate from the precipitate caused by sodium chloride was shaken with acetic ether which removed a small amount of tannin much lighter in color than that thrown out by sodium chloride. It was readily soluble in cold water.

Another portion of the original water percolate of the root was agitated with acetic ether without previously decolorizing by lead acetate. The substance removed was reddish-brown in color. This was dissolved in commercial ether and the solution so obtained distilled under reduced pressure in order to remove the acetic ether and render the substance porous. This residue was dissolved in water. The dense solution, upon standing in a cool room, separated a crop of yellow crystals. These were obtained, recrystallized from alcohol, in feathery forms composed of transparent yellow crystals which gave the reactions of protocatechuic acid.

Upon longer standing, the watery liquid deposited more crystals, square shaped and larger than above, but owing to the difficulty of completely separating adhering tannin, these were not obtained so pure as were the first. However, from general behavior, they were suspected to be chrysophanic acid, or perhaps emodin—since the latter has been found in the root.

Another portion of canaigre was percolated with petroleum ether to ascertain if the yellow coloring matter could be removed by that solvent. Besides chlorophyll, fat, and the small amount of the

A
yellow

yellow coloring substance removed, the crystalline principles just mentioned above were extracted.

By recrystallization, the second one was obtained sufficiently freed of fat to give the calcium hydrate and the ferric chloride tests for chrysophanic acid, which it also resembled by crystallizing in a square form.

The extraction with petroleum ether did not manifestly aid in getting a lighter colored or purer tannin.

All these tannins gave the same reactions as the one employed below.

After these several attempts at purification, the tannin from the water extract purified by means of lead acetate and acetic ether as at first described, was employed for the subsequent work.

This tannin was porous, yellow, readily soluble in water and free from sugars.

Upon saturating the alcoholic solution with ether, it was thrown out in a plastic condition.

A one per cent. solution gave the following reactions:

Ferric chloride,	}	green ppt.
and		
Ammonium hydrate,	}	brown ppt.
Ferrous sulphate,		no change.
Lead acetate,		yellowish ppt.
Gelatin and alum solution,		yellow ppt.
Tartar emetic,	}	no change.
and		
Ammonium chloride,	}	clouding, becoming a flocculent ppt.
Potassium bichromate,		greenish-brown ppt., darkening.
Fehling's solution,		reduced.
Ammoniacal silver nitrate,		reduced.
Calcium hydrate,		light pink ppt., turning red and brown.
Bromine water,		first yellow, then brown ppt.
Ammonium molybdate,		no change in color.
Cobalt acetate,		yellow ppt.
Uranium acetate,	}	crimson color, upon standing, a red-brown ppt.
Ammoniacal picric acid,		no change in color.
Ferric acetate,		green ppt.
Copper sulphate,	}	no change.
and		
Ammonium hydrate,		brown ppt., liquid brownish-green.

A portion of the solution used above gave with bromine water a yellowish precipitate, which, upon collecting and washing with

water, became red. The washings did not precipitate silver nitrate. The filtrate was warmed to remove the slight excess of bromine. The absence of the latter in a free state having been proven by agitating with chloroform, chlorine water was then carefully added and upon agitating again with chloroform, the latter was colored red showing bromine compounds to be present in the liquid. The latter was precipitated by silver nitrate, which would indicate hydrobromic acid.

The washed and reddened precipitate was fused with sodium carbonate which rendered the bromine capable of detection by silver nitrate and by chlorine and chloroform.

The tannin was then subjected to the following examinations:

Action of Heat.—0.5 gram of the tannin were heated with a few cubic centimetres of glycerin at 160° C. for twenty minutes and then raised to 190° C. for a few minutes, at which temperature considerable effervescence occurred. The mixture upon cooling was shaken with several portions of ether, sp. gr. .725, which upon being separated and evaporated yielded a residue of small square yellow crystals. But for a small amount of resinous substance soluble in alcohol, the crystals were completely soluble in water and gave the following characteristic reactions of catechol:

Calcium hydrate,	{ red color, turning brown and gradually precipitating.
Ferric chloride,	brownish-green color.
Ferric acetate,	brownish-green ppt.
Ferrous sulphate,	{ no change, upon standing a slight blue ppt., the liquid remaining colorless.

Action of Acids (Hydrolysis).—Two grams were boiled with two per cent. (absolute gas) hydrochloric acid for three hours, during which an amorphous, red, insoluble substance separated.

The contents of the vessel were allowed to cool, then filtered, the insoluble red substance washed with water and dried over sulphuric acid. The red filtrate was evaporated to dryness on a water-bath and the residue treated with water, which it slightly colored.

The insoluble red substance was filtered off, the filtrate shaken with several portions of ether, sp. gr. .725, which removed a colorless crystalline substance, the ether removed from the aqueous liquid by warming, the latter cooled and precipitated by basic lead acetate, filtered, excess of lead removed from filtrate by means of

hydrogen sulphide, lead sulphide separated by filtration, excess of gas boiled out of filtrate, the last made alkaline with sodium hydrate, and heated on a water-bath with Fehling's solution when some reduction occurred. The amount of cuprous oxide obtained was less than that obtained from the .3 gram used, when the tannin extracted by commercial ether was acted on with the same strength hydrochloric acid.

The evaporation to dryness made the red compound more insoluble in water, or, by removing the hydrochloric acid, entirely excluded it from solution. As the red substance was found to reduce Fehling's solution, it would appear probable that it caused the slight reduction observed.

Red Substance Produced by Action of Acids.—This was washed thoroughly with absolute ether to remove crystalline substances. In mass it was almost black; in powder, red-brown.

It was partly soluble in ammonium hydrate, sodium hydrate, sodium carbonate, and more than one-half was soluble in alcohol. The part soluble in alcohol behaved like the tannin toward ferric chloride. This was also the portion soluble in alkalis. Heated with Fehling's solution, the latter was reduced. Cold concentrated nitric acid completely oxidized the portion soluble in alcohol; hot nitric acid, the portion insoluble in that liquid. Upon standing in contact with water for twenty-four hours, it dissolved only to an extent sufficient to color the water reddish yellow; the residue remaining, as before, not completely soluble in alcohol.

The part insoluble in alcohol dissolved sparingly in alkalis, but only upon long standing.

Crystalline Substance Produced by Action of Acids.—The colorless crystalline substance, removed by ether previous to treatment with Fehling's solution, gave the following reactions for protocatechuic acid:

Ferric chloride,	}	green color.
and		
Sodium carbonate,	}	red color.
Ferrous sulphate,		
Fehling's solution,		in neutral solution, violet color.
Ammoniacal silver nitrate,		no change.
Basic lead acetate,		reduced.
		white ppt.
Neutral lead acetate,	{	white ppt., filtrate not precipitated by basic lead acetate (absence of phloro- glucin).

Action of Fused Alkali.—One gram was gradually added with constant stirring to potassium hydrate in the fused state. Effervescence occurred and an odor resembling that produced in making soap from rancid fat was noticed (fusing alkali alone did not give this odor). The fusion was allowed to become cold and solid, when it was treated with water which produced a clear and perfect solution. The alkali was supersaturated with dilute sulphuric acid, the slight excess of which was neutralized with acid sodium carbonate and the unfiltered mixture shaken with ether, sp. gr. .725, which upon evaporation left a yellow residue which was destitute of sweet taste (absence of phloroglucin), almost completely soluble in hot water, the remainder dissolved in alcohol. The pale yellow water solution reacted as follows :

Ferric chloride,	{ dark green color, changed to deep red upon adding excess of sodium carbonate.
Ferrous sulphate,	in a neutral solution, violet color.
Ammoniacal silver nitrate,	reduced.
Basic lead acetate,	brownish ppt.
Neutral lead acetate,	{ brownish ppt., the filtrate was further precipitated by basic lead acetate.
Fehling's solution,	no change (absence of phloroglucin).

Pine wood, saturated with the solution, dried and moistened with hydrochloric acid, turned yellowish (phloroglucin produces violet or red color). The above reactions indicate protocatechuic acid.

Acetyl Derivative.—0.5 gram of the tannin were boiled with a few cubic centimetres of acetic anhydride for an hour. The solution was poured into a relatively large bulk of water when the greater part of the derivative coalesced to form a plastic semi-solid, the remainder separating in an indistinctly granular form. The plastic portion was kneaded under the water and the granular portion washed by stirring. After standing over night, the coalescence had become a yellow solid.

The product was collected, dried over sulphuric acid, powdered, washed well with water and again dried over sulphuric acid. The drying was completed at from 75° to 80° C., above this temperature decomposition occurred as was shown by the acetous odor exhaled. Determinations of the melting point were undertaken, but it was noticed that considerable variation existed.

A larger quantity of the derivative was heated in a test tube on

a water-bath. At about 95° C., the substance fused, decomposition taking place, in which acetic anhydride was liberated, and at 100° C. the substance became a transparent, friable, solid mass.

Another portion of the derivative was boiled with water, which also caused acetous odor to be given off, but nothing was dissolved by the water which would give color with ferric acetate. Under the influence of the boiling water, the substance assumed a plastic condition, and, as would be expected, upon becoming cold, it became a brittle, opaque mass. Both residues fused above 100° C. and below 120° C. The former seemed to contain more acetic acid than the latter.

The tannin was submitted to combustion with the following results:

(I)	1629 gram tannin gave	3488 gm. CO ₂	and	0792 gm. H ₂ O.	
(II)	1376 " "	2912 " "		0652 "	
(III)	1815 " "	3875 " "		0872 "	
		I.	II.	III.	Average.
C,	58.39	57.71	58.22	58.10	
H,	5.40	5.26	5.33	5.33	
O,	36.21	37.03	36.45	36.57	

The result of these combustions indicates that canaigre tannin belongs to a group, of which the tannins from mangrove and rhatany are typical representatives.

GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

Adulterated litharge, containing ten per cent. of matter insoluble in acetic acid, is reported by Dr. A. Schneegans; the adulterant was proven to be fine white sand colored with a little ferric oxide.—*Journ. Phar. Els.-Lothr.*, 1893, 41.

Santonin reactions.—(1) The color reaction with sulphuric acid and solution of ferric chloride, if applied as follows, will uniformly give the same result: In a test tube, dissolve the santonin in sulphuric acid, in another tube mix about one-half drop of solution of ferric chloride with one cc. water; upon mixing the two solutions, considerable heat is evolved, but only enough to cause a yellow color in the mixture; if the test be warmed for a few seconds by use of

a spirit lamp or Bunsen burner, a fine violet coloration appears.—Stadelmann, *Südd. Apoth. Ztg.*, 1893, 70.

(2) If santonin be heated with potassium cyanide until a fused mass results, a red color appears, changing quickly to brown-yellow; the mass dissolved in water or solution of potassa forms a brown solution showing marked green fluorescence. (3) In fusing santonin with potassium hydrate a red coloration is noticeable, becoming darker by prolonged heating; the aqueous solution of the fusion is red, but changes through brown-yellow to yellow.—J. Schermer (*Nederl. Tijdschr. v. Pharm.*) *Apotheker Ztg.*, 1893, 77.

Theobromine estimation in cacao-beans.—The beans with an equal weight of purified sand are finely comminuted and then six grams of the mixture extracted with petroleum ether in a continuous extraction apparatus for ten hours, to remove the fat; the residue is boiled for one-half hour with 200 cc. distilled water and 6 gm. freshly prepared pure lead hydrate, strained, expressed and filtered; the insoluble portion is twice boiled with 100 cc. distilled water and the united filtrates evaporated to 10 cc., transferred to a separating funnel and agitated for three minutes with 100 cc. chloroform. After complete separation of the chloroform, requiring about three hours, the chloroform is removed and the operation repeated three times. From the combined chloroform solutions the greater portion of the solvent is distilled off, the remaining solution transferred to a tared beaker, the flask rinsed with warm chloroform and the contents of the beaker evaporated to dryness in a water-bath. The theobromine is obtained in the form of almost perfectly white, micro-crystalline powder which, by ignition upon platinum foil, leaves only traces of ash.—P. Süss (*Ztschr. f. anal. Chem.*), *Apotheker Ztg.*, 1893, 78.

Lanain, patented as a pure neutral wool-fat, is put upon the market as a soft, yellowish, homogeneous mass, melting at about 36° C.; it has only a faint odor indicative of its origin and loses this after some time; applied to the skin, this odor is not persistent; it is perfectly neutral in reaction and permanent in air. By mixing with water, it changes to a white, smeary ointment, the surface of which becomes brown on exposure; it is possible to incorporate as much as four times its own weight of water; by incorporating 25 per cent. of water lanolin is obtainable. Lanain is very quickly absorbed by the

skin, so that this property, also possessed by lanolin, is not due to the water contained in the latter. Lanain is offered as a substitute for the different fats and some fixed oils in the preparation of ointments, pomades, etc.—Dr. H. Hirzel, *Apotheker Ztg.*, 1893, 57.

Permanent physostigmine solutions can be made by dissolving physostigmine in carbonated water, transferring to small tubes, heating to 100° C. (which expels the excess of carbonic dioxide and sterilizes the solution) and hermetically sealing the tubes. The decomposition, according to Sabbatani, is due to the alkalinity of the solution caused by the solution taking up alkali from the glass and becoming red; the presence of the weakest acid, however, prevents this decomposition.—(*Riforma med.*) *Rundschau*, 1893, 144.

Distinction between soluble and organized ferments.—The addition of one per cent. of sodium fluoride immediately and permanently arrests the fermentations caused by organized ferments without interfering with the fermentations produced by soluble ferments. M. Arthus and A. Huber, in examining the action of sodium fluoride upon different fermentations, found that the process of decay, the ammoniacal fermentation of the urine and the alcoholic fermentation of sugar were prevented by the above chemical while the action of saliva, invertin, emulsin, pepsin and pancreatin were not interfered with. In the study of unknown fermentations, the use of sodium fluoride will give important information in deciding the cause of the fermentation.—(*Arch. d. Physiol.*) *Pharm. Centralhalle*, 1893, 70.

Test for pilocarpine.—The hydrochlorate of this alkaloid, mixed with calomel, becomes black, if exposed to moist air, or if it be breathed upon. The same reaction is given by cocaine hydrochlorate (*Am. Jour. Pharm.*, 1891, 132) although the color is not so intense.—W. Lenz, *Pharm. Centralhalle*, 1893, 79.

Teucrin is the name given by Professor von Mosetig-Moorhof to an extract of the plant *Teucrium Scordium*, found throughout central Germany, and which has been known since the earliest times as an excitant and anti-ferment. The remedy is prepared by making a decoction of the dried plant, concentrating to honey consistency and purifying by addition of alcohol; the filtered solution is evaporated until a specific gravity of 1.15 is obtained, when the extract is sterilized and hermetically sealed in glass vials holding three grams. In appearance it is a dark brown liquid, having a characteristic odor; it

is acid in reaction, ten grams requiring 11.4 cc. $\frac{n}{10}$ alkali for neutralization; total solids 20.80 per cent., including 4.60 per cent. ash. Other species of *Teucrium*, also *Pulegium vulgare* possess the same medicinal virtue, but in a lesser degree. *Teucrium* has been found a valuable remedy in the treatment of the fungoid local diseases, abscesses; it is used hypodermically and acts by causing increased blood circulation in the diseased part.—(*Wiener. Med. Bl.*) *Pharm. Centralhalle*, 1893, 89.

Pepsin.—At a recent meeting of the Berlin Pharmaceutical Society, Dr. F. Witte, speaking upon pepsin, stated that too stringent requirements regarding perfect solubility of pepsin were being made; that from his experience pepsins forming perfectly clear solutions had decreased albumin dissolving power. Pepsin dissolving 4,000 parts albumin could easily be made; he had been manufacturing, for American export, pepsin dissolving 10,000 parts of albumin, for some time. At the Columbian Exposition he intended to exhibit an *absolute pepsin*, but declined to state anything regarding its albumin solvent power.—*Pharm. Centralhalle*, 1893, 92.

Caffeine-iodol.—If caffeine and iodol, in molecular proportion, be mixed in alcohol solution, a crystalline addition product separates. The product is of a light gray color, odorless, tasteless and insoluble, or nearly so, in most solvents; it contains 74.6 per cent. iodol and 25.4 per cent. caffeine. As iodol, by prolonged keeping, liberates iodine and thus has injurious effect, the above permanent compound is considered worthy of trial.—E. Konteschweller; *Pharm. Centralhalle*, 1893, 95.

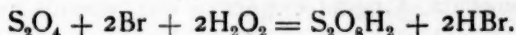
ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

Preparation of hydrobromic acid.—E. L  ger gives the following two processes in *Four. de Pharm. et de Chim.* (Feb. 1893, p. 188):

Introduce KBr into a retort and heat on a water-bath until the salt has attained a temperature of 100  ; then add sulphuric acid drop by drop, which causes the hydrobromic gas to become disengaged. However, a small portion of bromine and of sulphurous acid is also liberated. The gaseous mixture is purified by being passed first over a saturated aqueous solution of HBr, containing

an excess of bromine. In contact with this solution, the acid S_2O_4 becomes oxidized according to the equation :



Then the mixture is passed over a saturated aqueous solution of HBr, to which amorphous phosphorus has been added, when it loses all the bromine and is perfectly pure. The gas is dissolved in a distilled aqueous solution of HBr. The acid is nearly colorless and contains no trace of $S_2O_8H_2$.

The second mode of preparation of gaseous HBr, is by the action S_2O_4 on Br, in presence of a saturated solution of HBr. The S_2O_4 is passed into a mixture of equal volumes of Br and saturated solution of HBr, when an abundant and regular disengagement of HBr will be obtained, which can be freed of Br and the small quantity of S_2O_4 , by passing over the purifying solutions previously mentioned. $S_2O_8H_2$ forms at the same time with HBr, and if in sufficient quantity the liquid will separate into two layers.

Solubility of salicylic acid.—The employment of salicylic acid to obviate the inconveniences and accidents in surgery and obstetrics due to the use of mercuric chloride, is unsatisfactory because of its sparing solubility. Carcano and Cesaris (*Boll. farm.*, through *Four. de Pharm. d'Anvers*, Feb., 1893, p. 55) propose to associate boric acid with salicylic acid, in the following proportion: boric acid, 12 p.; salicylic acid, 6 p., and water, 1,000 p. This borosalicylic solution has the double advantage of being non-poisonous, and acting as a microbicide.

Pill-coating.—The following is M. Fauël's method: The pills are uniformly moistened with a liquid composed of one part of glycerin and two parts of strong alcohol; they are then rolled in a sufficient quantity of impalpable powder, composed of saccharin, 4 p.; gum tragacanth, 2 p., and potato starch, 1 p. Remove the excess of powder by means of a sieve, and repeat the operation. To have the pills white, they are then moistened with glycerin, 1 p.; ether, 2 p., and rolled in a powder composed of equal parts of talc and carbonate of calcium.

The following are the author's formulas for respectively cacao and gelatin coating: I. Cacao, 2 p.; saccharin, 2 p., and gum tragacanth, 1 p. II. Gelatin, 11 p.; saccharin, 5 p.; distilled water, 24 p.—*Pharm. Weekblad*, through *Four. de Pharm. d'Anvers*, Feb., 1893, p. 56.

Laxative pills.—A. F. Philippeau gives the following formula in *Jour. de Pharm. et de Chim.*, Feb., 1893, p. 248.

Cascara sagrada, 5 cgm.; extract of nux vomica and extract of belladonna, of each 1 cgm.; powdered ipecac and podophyllin, of each 1 cgm. For one pill, to be taken at night before retiring.

Preparation of chlorhydrosulphate of quinine.—Dissolve in the cold 30 parts crystallized quinine sulphate in 24 cc. hydrochloric acid (1.050) and allow the solution to evaporate spontaneously in dry air. A gelatinous layer separates which rapidly forms a hard mass of small agglomerated needles. The salt is very soluble in water, dries again in dry air and loses three molecules of water at 100° C.—*Comp. rend. de l'Acad. d. scien.*

Potassium iodide ointment.—Working by the following process a large proportion of potassium iodide can be incorporated with the base. The iodide is pulverized and dissolved in a sufficient quantity of hot glycerin (1 gm. to about 2.50 gm. glycerin); then mix this solution with petrolatum. The solution can be preserved for a long time if kept in yellow glass bottles.—*Bull. de la Soc. de Pharm. de Lyon.*

Test for iodates in alkali iodides.—Dissolve 2 gm. of the suspected iodide in 25 cc. of boiled distilled water, shading it from too strong a light. Add a little starch, then 10 cc. tartaric acid solution, when if an iodate is present, a blue color will be *immediately* formed.—Robineau and Rollin, in *Jour. de Pharm. et de Chim.*, Dec., 1892.

Preparation of camphor by means of ozone.—M. de Mare utilizes the oxidizing properties of ozone or ozonized air for the preparation of camphor from camphene. The camphene is distilled, the receiver heated, and on submitting it to ozonized air, the camphor begins immediately to sublime on the sides of the cylinder. The camphor thus obtained is identical with the high-priced Japan article.—*Lumière électrique.*

Preservation of medicinal distilled waters.—M. E. Crouzel (*Bull. de la Soc. de Pharm. de Bordeaux*, Jan., 1893, p. 17) considers the principal causes of alteration, the use of non-sterilized containers, exposure to air, contact with organic material, and principally filtering through paper. To avoid this latter cause he proposes, if filtering paper is to be used, to first pass a large quantity of simple distilled water through it, and then to submit it to a temperature

sufficiently high to sterilize it. He uses glass for filtering, which, besides retaining the suspended impurities as well as the paper, has the additional advantage of serving indefinitely. He suggests further that the containers should be of such a dimension as to insure rapid emptying.

Alteration of iodoform preparations.—When iodoform is dissolved in liquid cacao butter, and the mixture allowed to solidify, exposure to the light will soon cause a reddish coloration. H. Barnouvin (*Four. de Pharm. et de Chim.*, March, 1893, p. 274) finds that while fluid preparations show this change even in the dark, solid iodoform preparations remain unaltered indefinitely if exposure to the light is avoided.

Benzoparacresol, analogous to *benzonaphthol-benzosol*, is prepared according to M. Petit by treating paracresol with sodium benzoate in the presence of oxychloride of phosphorus; it crystallizes from hot alcohol in beautiful crystals, having a slight ethereal odor, and a fusing point of 70–71°; insoluble in water, but very soluble in ether and chloroform.—*Four. de Pharm. et de Chim.*, March, 1893, p. 294.

Purity of zinc.—According to Lescoeur (*L'Union pharm.*, Jan., 1893, p. 34), zinc, prepared by the double treatment of oxidation by potassium nitrate, and fusion with zinc chloride, is entirely free from arsenic, antimony, sulphur and phosphorus, while the iron, lead, copper, etc., which it still contains, present ordinarily no inconveniences. On the contrary, the presence of these metals facilitates the action of acids and the disengagement of hydrogen.

Cerberin is a glucoside obtained from a Mexican plant of the genus *Thevetia*, nat. ord. Apocynaceæ. It is a yellowish, amorphous, bitter powder, easily soluble in water and alcohol; the action of dilute sulphuric acid produces glucose and cerberesin. Dr. Zotos (thesis, Dorpat, 1892) shows its physiological effects on the heart, when administered hypodermically, to be analogous to those of the digitalis group.—*L'Union pharm.*, Feb., 1893, p. 90.

Myrrholin is a solution of one part of myrrh in one of oil, and is said to have given good results in tuberculous laryngitis; it is administered in capsules containing 0.20 gm. of myrrholin and 0.30 gm. of creasote.—*L'Union pharm.*, Feb., 1893, p. 95.

Resorcylalgin.—On mixing β -resorcylic acid and analgesin, a pre

cipitate is formed which is soluble in alcohol and slightly so in water, and forms with the alkaline bases soluble salts (resorcinalginates). The ammonium salt is very soluble in water and has a saccharine taste.—A. Petit, in *Four. de Pharm. et de Chim.*, March, 1893, p. 294.

For chapped hands.—The following formula is published in *Four. de Pharm. et de Chim.*, March, 1893, p. 296. Green soap, 1 part; compound tincture of benzoin, 4 p.; glycerin, 8 p.; and rose water, 16 p.

Corn-cure.—The following formula will be found in *Journ. de Pharm. et de Chim.*, Feb., 1893, 248. Dissolve extract of Indian cannabis 1 part, salicylic acid 10, and turpentine 5, in collodion 82, and add 2 parts acetic acid.

BEHAVIOR OF SOME METALS WITH GASES.

BY G. NEUMANN.

The portion of this investigation relative to hydrogen has been executed by the author in conjunction with F. Streintz. Their attention was drawn to the question by the view that lead as the negative plate of a secondary element is capable of occluding hydrogen.

A proof for the correctness of this view could not be obtained by direct electrolytic experiments, as the arrangement of the experiment proved too difficult. Better results were obtained on allowing pure, dry hydrogen to pass through melted lead in a U-tube.

After the gas had been passed for a considerable time, the excess was driven out by nitrogen. Oxygen was then passed through, and this again was expelled by dry air. The water formed by the action of oxygen was received in calcium chloride tubes and weighed, and the quantity of hydrogen absorbed by the metal was thus calculated. In two experiments which could be regarded as successful the result was in one case 0.15 times the volume of the metal, and in the other 0.11 times. Hence the occluding power of lead for hydrogen seems demonstrated.

The next experiments were made with palladium. This metal, as is well known, occludes hydrogen very greedily. The experiments as well as those with other metals still to be mentioned, were executed in an analogous manner to those on lead, *i. e.*, the dry

hydrogen was passed over the heated metal. The metal was used as palladium black. Hydrogen was absorbed to the extent of 502.35 times the volume of the metal.

Platinum was examined as platinum sponge and platinum black. The latter acts more energetically, is raised to redness by absorption without the application of external heat, as is palladium by the absorption of oxygen. Platinum sponge occludes 49.30 times its volume of hydrogen. This figure varies considerably from that found by Graham. For an explanation of this difference we must refer to the original.

Gold occludes relatively much hydrogen; the action of oxygen upon the metal charged with hydrogen is not very strong. In two experiments there were obtained, respectively, 46.32 and 37.31 times the volume of the metal. Here also the values were decidedly higher than those ascertained by Graham. The latter used gold from so-called assay-rolls, whilst the authors employed a preparation obtained by precipitating the chloride with oxalic acid.

Silver absorbs, according to the author's experiments, no hydrogen, whilst, according to Graham, silver wire occludes 0.211 times its volume. Aluminum absorbs 2.72 times its volume of hydrogen in thin sheets previously purified.

Iron in a state of fine division absorbs 19.17 times its volume. Copper occludes about four and a half times its volume.

Nickel, which in its chemical properties is intermediate between copper and iron, behaves similarly in its occlusive power for hydrogen. It occludes 17.57 volumes.

The absorption of hydrogen by cobalt is rather large, and the metal when charged with hydrogen becomes incandescent in a current of oxygen.

The occlusive power of some metals for hydrogen decreases on a repetition of the experiments. The authors explain this in the noble metals by an increase of density. This occurs according also to Graham. Copper and nickel on a repetition of the experiment show the same occlusive power. In the case of iron and cobalt, which behave like the noble metals, the authors have not yet found any explanation.

Neumann has examined the behavior of the precious metals with oxygen by a method analogous to that above described.

The metals were ignited for some hours in pure oxygen, two cal-

cium chloride tubes were then attached before the occlusion tube, and a potash apparatus to observe the rapidity of the gas; the oxygen was displaced by air, and this, again, after cooling, by nitrogen. After the current has passed for half an hour, hydrogen was introduced and heat was applied. The water formed was received in the calcium chloride tubes, which were weighed after they had been successively traversed by nitrogen and air.

Silver on being thus treated absorbed 4.09 vols., which does not agree badly with Graham's result, according to which from 6.15 to 7.4 vols. were absorbed.

Gold absorbed 48.49 vols. of oxygen, whilst Graham observed no absorption. Neumann believes that this difference may be explained by the temperature of the experiment.

In case of platinum, concerning the absorptive power of which for oxygen there is much discrepancy among former observers, Neumann found occlusion of 77.14 vols. With palladium the author found a formation of sub-oxide, since the residue after treatment with oxygen contained 6.99 per cent., whilst Pd_2O contains 7.33 per cent.

Neumann considers that the absorptions of oxygen depend on a power of the metals to become oxidized at about 450° , the temperature of the experiment.—*Zeit. Anal. Chemie*, vol. xxxii, p. 72; *Chem. News*, March 10, 1893.

RULES FOR THE SPELLING AND PRONUNCIATION OF CHEMICAL TERMS.

The American Association for the Advancement of Science, at its meeting in 1887, appointed a committee to consider the question of attaining uniformity in the spelling and pronunciation of chemical terms. The work required extensive correspondence and detailed discussion, extending over four years, when in 1891 the following rules were adopted by the Association and recommended to chemists generally, but especially to those engaged in teaching, in the hope that they will cordially unite in the efforts to bring about uniformity in usage. The committee consisted of T. H. Norton, Ph.D., Professor of Chemistry, University of Cincinnati; Edward Hart, Ph.D., Professor of Chemistry, Lafayette College, Easton, Pa.; H. Carrington

ton Bolton, Ph.D., University Club, New York; Jas. Lewis Howe, Ph.D., M.D., Polytechnic Society, Louisville, Ky. The rules have recently been republished by the Bureau of Education, and the spelling has been adopted by several chemical journals, and it is to be hoped that the desired uniformity may be reached before long, even though certain modifications may become desirable, the committee having been well aware that these rules are not to be regarded as final.

GENERAL PRINCIPLES OF PRONUNCIATION.

- (1) The pronunciation is as much in accord with the analogy of the English language as possible.
- (2) Derivatives retain as far as possible the accent and pronunciation of the root word.
- (3) Distinctly chemical compound words retain the accent and pronunciation of each portion.
- (4) Similarly sounding endings for dissimilar compounds are avoided (hence **id**, **-ite**).

ACCENT.

In polysyllabic chemical words, the accent is generally on the antepenult; in words where the vowel of the penult is followed by two consonants, and in all words ending in **-ic** the accent is on the penult.

PREFIXES.

All prefixes in strictly chemical words are regarded as parts of compound words, and retain their own pronunciation unchanged (as *ă'ceto-*, *ă'mido-*, *ă'zo-*, *hŷ'dro-*, *ĩ'so-*, *nĩ'tro*, *nĩtrō'so-*).

ELEMENTS.

In words ending in **-ium**, the vowel of the antepenult is short if **ĩ** (as *ĩrĩ'dium*), or **y** (as *dĩdŷ'mium*, or if before two consonants (as

Fâte, fât, fâr, mête, mêt, pîne, pîn, marine, nôte, nôt, möve, tûbe, tûb, rûle, mŷ, ŷ = ĩ.

' Primary accent; " secondary accent. N. B.—The accent follows the vowel of the syllable upon which the stress falls, but does not indicate the division of the word into syllables.

că'lcium), but long otherwise (as tītā'nium, sělē'nium, chrō'mium).

alūminum	e'rbium	me'rcury	sō'dium
a'ntimony	flū'orin	mōlŷbdenum	strō'ntium
a'rsēnic	gă'llium	nī'ckel	(shium)
bā'rium	germā'nium	nī'trogen	sū'lfur
bi'smuth (biz)	glū'cinum	ō'smium	tāntalum
bō'ron	gold*	ō'xygen	tellū'rium
brō'mīn	hŷ'drogen	pallā'dium	te'rbium
că'dmium	ī'ndium	phōs'phorus	thă'llium
călcium	ī'ōdīn	plă'tinum	thō'rium
ca'rbon	īrī'dium	potă'ssium	tin
cē'rium	iron	rhō'dium	tītā'nium
cē'sium	lă'nthanum	rubī'dium	tŭ'ngsten
chlō'rin	lead	ruthē'nium	ūrā'nium
chrō'mium	lī'thium	samā'rium	vănā'dium
cō'balt	magnē'sium	scă'ndium	ytte'rbium
colū'mbium	(zhium)	sělē'nium	ŷ'ttrium
co'pper	ma'nganese	sī'licon	zinc
dīdŷ'mium	(eze)	silver	zircō'nium

Also: ämmō'nium, phosphō'nium, hă'logen, cŷă'no-gen, ämī'dogen.

Note in the above list the spelling of the halogens, cesium and sulfur; **f** is used in the place of **ph** in all derivatives of sulfur (as sulfuric, sulfite, sulfo-, etc.).

TERMINATIONS IN -ic.

The vowel of the penult in polysyllables is short (as cŷă'nic, fūmă'ric, arsē'nic, silī'cic, īō'dic, bū'tŷ'ric), except (1) **u** when not before two consonants (as mercū'ric, prŷ'ssic), and (2) when the penult ends in a vowel (as benzō'ic, olē'ic); in dissyllables it is long except before two consonants (as bō'ric, cī'tric).

Exception: acē'tic or acĕ'tic.

The termination **-ic** is used for metals only where there is a contrast with **-ous** (thus avoid aluminic, ammonic, etc.).

TERMINATIONS IN -ous.

The accent follows the general rule (as plă'tinous, sŷlfurous, phō'sphorous; coba'l'tous).

Exception: acē'tous.

TERMINATIONS IN **-ate** AND **-ite**.

The accent follows the general rule (as *ă'cetāte*, *vă'nadāte*); in the following words the accent is thrown back (as *ă'bietāte*, *ă'lcoholāte*, *ă'cetonāte*, *ă'ntimonīte*).

TERMINATIONS IN **-id** (FORMERLY **-ide**).

The final **e** is dropped in every case and the syllable pronounced **id** (as *chlō'rīd*, *ī'odīd*, *hŷ'drīd*, *ō'xīd*, *hŷdrōx'īd*, *sŭ'l-fīd*, *ă'mīd*, *ă'nilīd*, *mŭrĕ'xīd*).

TERMINATIONS IN **-ane**, **-ene**, **-ine** and **-one**.

The vowel of these syllables is invariably long (as *mĕ'thāne*, *ĕ'thāne*, *na'phthalēne*, *a'nthracēne*, *prō'pīne*, *quī'nōne*, *ă'cetōne*, *kĕ'tōne*).

A few dissyllables have no distinct accent (as *benzēne*, *xŷlĕne*, *cĕtĕne*).

The termination **-ine** is used only in the case of doubly unsaturated hydrocarbons, according to Hofmann's grouping (as *propīne*).

TERMINATIONS IN **-in**.

In names of chemical elements and compounds of this class, which includes all those formerly ending in **-ine** (except doubly unsaturated hydrocarbons) the final **e** is dropped, and the syllable pronounced **-in** (as *chlō'rīn*, *brō'mīn*, etc., *ă'mīn*, *ă'nilīn*, *mō'rphīn*, *quī'nīn*, *vanī'llīn*, *alloxă'ntīn*, *absī'nthīn*, *emŭ'lsīn*, *că'ffeīn*, *cō'caīn*).

TERMINATIONS IN **-ol**.

This termination, in the case of specific chemical compounds, is used *exclusively* for alcohols, and when so used is never followed by a final **e**. The last syllable is pronounced **-ol** (as *glŷ'cōl*, *phĕ'nōl*, *crĕ'sōl*, *thŷ'mōl* (ti), *glŷ'cerōl*, *quī'nōl*).

Exceptions: *ălcohōl*, *a'rgōl*.

TERMINATIONS IN **-ole**.

This termination is always pronounced **-ole**, and its use is limited to compounds, which are not alcohols (as *ī'ndōle*).

TERMINATIONS IN **-yl**.

No final **e** is used; the syllable is pronounced **ŷl** (as *ă'cetŷl*, *ă'mŷl*, *cĕ'rotŷl*, *cĕ'tŷl*, *ĕ'thŷl*).

TERMINATIONS IN **-yde**.

The **y** is long (as *ă'ldēhȳde*).

TERMINATIONS IN **-meter**.

The accent follows the general rule (as *hydrŏ'meter*, *barŏ'meter*, *lactŏ'meter*).

Exception: Words of this class used in the metric system are regarded as compound words, and each portion retains its own accent (as *cĕ'ntime''ter*, *mi'llime''ter*, *kī'lome''ter*).

MISCELLANEOUS WORDS

which do not fall under the preceding rules.

Note the spelling: *albumen*, *albuminous*, *albuminiferous*, *asbestos*, *gramme*, *radical*.

Note the pronunciation: *a'lkalīne*, *a'lloy* (n. & v.) *a'llotropy*, *a'llotropism*, *ī'somerism*, *pŏ'lymerism*, *appārā'tus* (sing. & plu.), *āqua regia*, *barȳ'ta*, *cĕntigrade*, *co'ncentrated*, *crystallīn* or *crystalline*, *electrŏ'lysis*, *līter*, *mŏlecule*, *mŏ'lĕ'cular*, *nŏ'menclā'ture*, *olĕ'fi-ant*, *vā'lence*, *ū'nivā''lent*, *bī'vā''lent*, *trī'vā''lent*, *qua'drivā''lent*, *tī'trate*.

A LIST OF WORDS WHOSE USE SHOULD BE AVOIDED IN FAVOR OF THE ACCOMPANYING SYNONYMS.

<i>For</i>	<i>Use</i>
beryllium	glucinum
niobium	columbium
thein	caffein
titer (n.)	strength or standard
titer (v.)	titrate
monovalent	univalent
divalent, etc.	bivalent, etc.
quantivalence	valence
sodic, calcic, zincic,	sodium, calcium, zinc,
nickelic, etc., chlorid,	nickel, etc., chlorid, etc.
etc.	(vid. terminations in -ic supra.)
arsenetted hydrogen	arsin
antimonetted hydrogen	stibin
phosphoretted hydrogen	phosphin
sulfuretted hydrogen, etc.	hydrogen sulfid, etc.
alkylogens	alkylhaloids

<i>For</i>	<i>Use</i>
benzol	benzene
toluol, etc.	toluene, etc.
pyrocatechin	catechol
resorcin, etc.	resorcinol, etc.
hydroquinone (and hydro-	
chinon	quinol
orcin	orcinol
hydrophlorone	phlorol
phloroglucin	phloroglucol
quercite	quercitol
pinite	pinitol
glycerin	glycerol
erythrite, erythroglucin,	
eryglucin, erythroman-	
nite, phycite	erythrol
mannite	mannitol
dulcite, etc.	dulcitol, etc.
sorbite	sorbitol
furfurol	furfuraldehyde
fucusol	fucusaldehyde
anisol	methyl phenate
phenetol	ethyl phenate
anethol.	methyl allyl-phenol

ARSENIOUS IODIDE.

By D. B. DOTT, F.I.C., F.R.S.E.

The Pharmacopœia does not give specific directions for the preparation of this compound, but states that it is "obtained by the direct combination of iodine and metallic arsenium, or by evaporating to dryness an aqueous mixture of arsenious and hydriodic acids." It is described as "small orange colored crystals, readily and most entirely soluble in water and rectified spirit." The papers of Bamberger¹ and others give much information about arsenious iodide, but our own experience and examination of samples give sufficient additional information to warrant my bringing this note before you. Commercial specimens are met with which contain a large propor-

¹ *Berichte*, xiv, 2,643.

tion of insoluble matter, uncombined arsenium and arsenious oxide, but we will only take into account those samples which come fairly within the B. P. requirements.

(1) 1·866 gramme treated with warm water, insoluble matter collected on filter and well washed, gave ·024 gramme, = 1·28 per cent. insoluble.

·700 gramme dissolved in water with excess of nitric acid gave 1·077 gramme AgI, = ·582 gramme, Iodine, = 83·15 per cent.

83·55 required for AsI_3 .

(2) The same salt recrystallized from water and dried by exposure to the air. ·408 gramme gave ·180 AgI, = ·097 Iodine, = 23·84 per cent.

·535 gramme gave ·444 As_2S_3 , = ·2707 Arsenic, = 50·59 per cent.

(3) 1·469 gramme treated with water, as in No. 1, left ·009 gramme insoluble, = ·61 per cent.; and the solution gave 2·134 grammes AgI, = 1·153 Iodine, = 78·51 per cent. The di-iodide AsI_2 requires 77·20.

(4) 2·8 grammes arsenious oxide were dissolved in 64 cc. hydriodic acid (11 per cent.), and solution evaporated to dryness with heat of a water-bath, ·891 gramme gave 1·199 AgI, = ·648 iodine, = 72·73 per cent.

These results prove that it is practicable to prepare a salt of composition nearly agreeing with the formula AsI_3 , but that the tendency is towards a deficiency of iodine, that treatment with water produces extensive decomposition with separation of a very basic salt, and that the alternative method referred to in the Pharmacopœia does not yield a salt of the composition required. We may perhaps infer that this is an instance in which it would be better for the Pharmacopœia not to refer to the methods of preparation but rather to content itself with giving sufficient tests for purity.—*Phar. Jour. and Trans.*, p. 619, Jan. 28, 1893.

DETERMINATION OF CALCIUM TARTRATE.

BY CH. ORDONNEAU.

We take 20 grms. calcium tartrate, an average sample, pulverize them finely in the mortar, and add 20 cc. of commercial hydrochloric acid at 20°, diluted in 100 grms. of water. The solution may be promoted by heating to ebullition. We make up 202–203

grms., according to the quantity of the insoluble matters, and filter. We take 50 grms. of the solution when cold, and pour it into a flask holding about 90 cc. We add 2 cc. of solution of citric acid at 25 per cent. and then 10 cc. of solution of calcium acetate at 25 per cent. (25 grms. calcium acetate and water to make up 100 cc.) We agitate strongly, when crystals of calcium tartrate form after a few minutes. We then add 5 cc. more of the same solution of calcium acetate, agitate, and allow it to settle for fifteen or thirty minutes. All the tartar is precipitated in a pure state.

We pour the whole upon a plain filter 9 cm. in diameter, detach the tartar adhering to the flask with a slender piece of curved wood, wash the flask and the tartar from the filter with 30 cc. of water in several portions.

The filter is then opened and laid on a plate of copper or sheet-iron above a water-bath. The paper dries enough to permit the separation of the tartar, which is transferred to a round nickel capsule 9 cm. in diameter. The filter is dried completely, the tartar is detached and added to that in the capsule.

The capsule is then placed on the water-bath so as to dry the calcium tartrate completely. The desiccation is promoted by stirring the mass with a very pliable spatula. We cease when the tartar, which forms clots as long as it is moist, begins to flow like dry sand. At this moment we wipe the capsule and weigh the tartar obtained.

The result found, multiplied by twenty, gives the standard of the tartar if we have operated upon 5 grms. of substance. To this must be added 2 per cent. to compensate for the loss on the filter and the solubility of calcium tartrate.

The exact moment of drying must be seized when the calcium tartrate contains $4\text{H}_2\text{O}$. Each additional minute causes a loss of 0.10 per cent. of tartar, but as the point is easy to seize (for it occurs suddenly on stirring the substance), there is no error in this respect beyond 0.20 per cent., which may be neglected.

By this process there are formed calcium tartrate, calcium chloride, and free acetic acid, which has no action on calcium tartrate. As the precipitation of the tartar is always effected in a very acid liquid, malic acid, if it is present, remains in solution and does not falsify the results.

The object of the citric acid is to dissolve the aluminium phosphate, which forms a lake with the coloring matter, and which the

acetic acid does not dissolve. It is also without action upon calcium tartrate. It is preferable to precipitate in two portions, since the crystals of tartar are thus coarser, which renders it easier to seize the exact moment when the moisture is expelled.

If we wish to determine the total acidity of any tartar we must operate in the same manner, adding 25 cc. of solution of calcium acetate in two portions. This quantity is sufficient for 5 grms. pure potassium bitartrate, and consequently the process is general.

The calcium tartrate must be washed, collected, and weighed. We have then to add 2 per cent. to the amount found, and on multiplying the calcium tartrate by 0.576 we have the value in tartaric acid.

Second Process.—We take 50 grms. of the solution of tartar, which is poured into a porcelain capsule and heated to ebullition. We add then some drops of solution of phenolphthalein, and then gradually, and with continual stirring, a clear milk of lime which has been strained through silk. The source of heat is extinguished or removed as soon as "bumping" sets in; the saturation is continued, giving the calcium tartrate time to subside after each addition of lime, and ceasing when neutrality is reached, which requires about five minutes. We add then to the liquid 2 cc. of the citric solution at 25 per cent., stir and allow it to subside. After some minutes, the temperature is 50° to 60°, when we decant, pour the tartar upon a plain filter of 0.09 metre, and wash with 30 cc. of water.

The calcium tartrate is dried as above, taking care not to break the filter. To the result obtained we add 4 per cent. for the solubility of the substance in the liquid and the loss on the filter. Even if the quantity of malate exceeds 20 per cent., which is a very rare case, we need add only 3 per cent. for accuracy, as the solubility is then lower. The quantity of malate is found by the deficiency of the result plus the insoluble matters to make up 100. On operating thus on pure calcium tartromalate, or on a mixture of the two salts in equivalent proportions, we find 99.50 per cent. of calcium tartrate almost free from malate.

This process has the advantage of serving for industrial refining. In place of adding citric acid we leave a slight acidity, which dissolves the alumina and the phosphates. The tartar obtained is pure if the liquid is decanted whilst lukewarm, for complete refrigeration precipitates the calcium tartromalate to the extent of about 10 per

cent. of the tartar operated upon. This salt is collected and utilized in a fresh operation.—*Bull. Soc. Chim., Paris*, series 3, ix-x, p. 68; *Chem. News*, March 10, 1893.

EUROPHEN¹

BY DR. EICHOFF.

In July, 1891, Eichoff gave a favorable account of the action of europfen, which is the iodide of isobutylorthocresol. It is an amorphous yellow powder, with a slightly aromatic smell, not soluble in water and glycerin, but very soluble in alcohol, ether and chloroform. It is soluble too in collodion and oil. Eichoff reported a series of cases in which he had used it with great advantage in ulcers for the most part specific, scrofuloderma, and lupus exedens. In some cases he employed simply powdered europfen, in others he used ointments of various kinds, containing usually 5 per cent. of europfen. No good consequence followed its use in gonorrhœa, psoriasis, parasitic diseases, and urticaria.

He also injected a 1.5 per cent. solution of europfen in olive oil, each injection containing $\frac{1}{4}$ of a grain. This gave rise to no pain or local troubles. After the injection of larger doses, patients complained of pain in the head and liver, and he advised that at first the smaller doses should be used, though afterwards the amount might be increased. The injections of europfen were chiefly used in syphilitic affections and lesions, and seemed to be of value.

In the *Therap. Monat.*, for January, 1893, Eichoff points out that many observers have confirmed his views as to the utility of europfen. After further experience, however, he is inclined to abandon its subcutaneous use in syphilitic ailments, since the benefit it causes is only temporary, but as an external application in syphilitic soft ulcer, he finds it of very great advantage. After washing the ulcer he applies the powder, covering the whole with wadding. Where the surface of the ulcer is raised, he first touches it with nitrate of silver. He points out that it must not be used with or soon after a sublimate solution, for then irritation is set up, owing to the iodide of mercury formed. In scrofuloderma and lupus exedens, he used either a 3 per cent. ointment or the powder, and found cicatrization follow. It was of no service, however, where the lupus and scrofu-

¹ Medical Chronicle, February, 1893, p. 331.

lous surfaces were more or less covered with epidermis. He says also that it is of use in gonorrhœa of women with ulcerations in the vagina and on the cervix uteri.

He looks upon euiophen, then, as a substitute for iodoform, over which it has the advantage of causing no injurious effects after absorption, and having no unpleasant smell.

PIPERAZINE.¹

BY W. MAJERT and A. SCHMIDT.

Erroneous statements have appeared in several modern textbooks regarding the physical and chemical characters of piperazine, $C_4H_{10}N_2$, which have been confused with those ascribed by A. W. von Hofmann and by Ladenburg to the impure substances of like composition discovered by them, and termed respectively diethylenediamine and ethyleneimine or diethylenediimine; our attention has been directed to the fact that this misunderstanding has partly arisen from a misconstruction of our views (*Ber.*, 1890, 3719) as to the identity of these substances: we, therefore, desire to correct this impression.

Piperazine, which was not known in its pure crystalline condition until prepared by us in August, 1890, by treatment of dinitrosodiphenylpiperazine with alkali, is a crystalline substance melting at $104-107^\circ$ in capillary tubes, although when the melting point is determined on large quantities it is found to be 112° , the differences being due to the hygroscopic nature of the base; it boils at $140-145^\circ$. It is very readily soluble in water and alcohol, the aqueous solution having a distinctly alkaline action. It is very hygroscopic and readily absorbs carbon dioxide, being thereby converted into the carbonate melting at $162-165^\circ$.

Piperazine is especially characterized by the formation of an insoluble pomegranate-red double salt with bismuth iodide and by a dibenzoyl compound melting at 191° .

The basic substance diethylenediamine prepared by Hofmann by the interaction of ammonia and ethylene bromide consisted of a liquid mixture of bases boiling approximately at 170° . That this mixture contained a small quantity of a base identical with piperazine

¹*Chem. News*, March 3, 1893, p. 108; from a paper read before the Chemical Society.

zine is undoubted, but it was only after piperazine had been prepared from dinitrosodiphenylpiperazine that Hofmann succeeded in identifying it and isolating the pure crystalline product from the mixture, which, besides higher ethylene bases, contained also a number of vinyl compounds.

Owing to the difficulty of purifying small quantities of the base, Ladenburg's experiments with diethylenediamine, obtained by the decomposition by heat of ethylenediamine hydrochloride, were unsuccessful: the product described by Ladenburg as the base was undoubtedly impure piperazine carbonate, as proved by its melting point, 159–163°.

In conclusion, it may be interesting to mention that we have succeeded in preparing the following series of hydrates of piperazine, that most readily formed being a hexhydrate which crystallizes from dilute aqueous solutions:

$C_4H_{10}N_2 \cdot H_2O$, m. p. 75°,	
“ $2H_2O$, “ 56°,	
“ $3H_2O$, “ 39–40°,	
“ $4H_2O$, “ 42–43°.	
“ $5H_2O$, “ 45°,	
“ $6H_2O$, “ 48°.	

COCA LEAVES.¹

BY O. HESSE.

In this paper, the author gives a short account of the various substances which have been obtained from coca leaves; with a few exceptions, most of the compounds here referred to have been previously described by the author (A. J. Ph., 1889, p. 296), Liebermann, Einhorn, Giesel and others (see Am. Jour. Phar., 1889, 433; 1890, p. 422; 1892, p. 44).

Cinnamylcocaine hydrochloride, $C_{19}H_{23}NO_4 \cdot HCl + 2H_2O$, crystallizes from water, in which it is readily soluble, in lustrous plates, loses its water at 66°, and melts at 176°; its specific rotatory power in aqueous solution is $[\alpha]_D = -104.1$. The *platinochloride*, $(C_{19}H_{23}NO_4)_2H_2PtCl_6$, crystallizes in small needles, and is moderately easily soluble in boiling water. The *aurochloride*, $C_{19}H_{23}NO_4 \cdot HAuCl_4$, crystallizes in small yellow needles, and melts at 156°. The *methiodide*, $C_{19}H_{23}NO_4 \cdot MeI$, crystallizes from alcohol in small,

¹ *Annalen*, **271**, 180–228; Jour. Chem. Soc., 1893, Abstr. I, p. 57.

colorless needles; the corresponding *methochloride* is a crystalline substance, readily soluble in water and alcohol, but insoluble in ether.

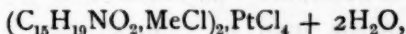
The molecular formula of *homococaïc acid*, determined in glacial acetic acid solution, was found to be $C_9H_8O_2$. This acid melts at 150° , and dissolves freely in alcohol, ether, chloroform, glacial acetic acid, and hot water, but is only sparingly soluble in light petroleum and cold water; it is only slowly oxidized by a warm solution of potassium permanganate. A number of its salts were prepared and analyzed, but they are all amorphous, ill-characterized compounds. The *nitro*-derivative, $C_9H_7O_2NO_2$, prepared by warming the acid with nitric acid of sp. gr. 1.52, crystallizes from dilute acetic acid in yellowish needles, melts at 226° , and is readily soluble in alcohol and glacial acetic acid, but more sparingly in chloroform, ether and boiling water.

β -*Cocaïc acid*, $C_{18}H_{16}O_4$, is formed when homococaïc acid is heated for a long time with concentrated hydrochloric acid, or fused with potash; it crystallizes from boiling water in long, colorless needles, melts at 189° , and is readily soluble in glacial acetic acid, alcohol and chloroform, but more sparingly in benzene, and almost insoluble in light petroleum; its molecular weight was determined in glacial acetic acid solution, with results in accordance with the molecular formula given above. It is only very slightly acted on by potassium permanganate. The *potassium* salt crystallizes in lustrous prisms, and is readily soluble in cold water. The *copper* salt, $C_{18}H_{14}O_4Cu + 2H_2O$, is a green, crystalline compound, and loses its water at 160° , becoming dark-blue. The *silver* salt, $C_{18}H_{14}O_4Ag_2$, is stable in the light. The *methyl* salt, $C_{18}H_{14}O_4Me_2$, is a mobile oil. The *dinitro*-derivative, $C_{18}H_{14}O_4(NO_2)_2$, prepared by treating the acid with concentrated nitric acid, crystallizes from glacial acetic acid in pale yellow prisms, melts at 252° , and is readily soluble in alcohol, chloroform, glacial acetic acid, and ether, but more sparingly in water.

β -*Isococaïc acid* or δ -*truxillic acid* (compare Liebermann, Berichte, 1889, 2249), prepared from isococaïc acid in like manner, has the molecular formula $C_{18}H_{16}O_4$; it melts at 172° , not at 174° , as stated by Liebermann. The *barium* salt, $C_{18}H_{14}O_4Ba + 4H_2O$, crystallizes in short, lustrous prisms; the *copper* salt crystallizes with 2 mols. H_2O . The *dinitro*-derivative, $C_{18}H_{14}O_4(NO_2)_2$, crystallizes from

dilute acetic acid in small, almost colorless prisms, melts at 226° , and is very readily soluble in alcohol and ether, but almost insoluble in benzene.

Benzoylpseudotropine methiodide, $C_{15}H_{19}NO_2MeI$, forms colorless crystals, and is moderately easily soluble in hot, but only sparingly in cold alcohol. The corresponding *methochloride*, $C_{15}H_{19}NO_2MeCl$, crystallizes in colorless needles or prisms; its *platinochloride*,



forms small, orange needles, and is sparingly soluble in cold water; its *aurochloride*, $C_{15}H_{19}NO_2MeClAuCl_3$, is a yellow, crystalline compound, sparingly soluble in cold water.

Pseudotropine methiodide, $C_8H_{15}NOMeI$, crystallizes from hot water in small, colorless, rhombic crystals, and melts at 270° . The *methochloride*, $C_8H_{15}NOMeCl$, forms compact, rhombic crystals, and is readily soluble in water, but only sparingly in alcohol; its *platinochloride*, $(C_8H_{15}NOMeCl)_2PtCl_4$, separates from hot water in crystals, and melts at 216° .

Palmityl β -amyirin, $C_{46}H_{80}O_2$, occurs in Trujillo coca; it melts at 75° , dissolves freely in ether, chloroform, light petroleum, hot alcohol, and acetone, and has a specific rotatory power $[\alpha]_D = 54.5^{\circ}$ in alcoholic solution; on hydrolysis, it yields palmitic acid and β -amyirin. The wax obtained from the broad-leaved coca of Peru and Bolivia consists of palmityl- β -amyirin and cerotone, $C_{33}H_{106}O$, melting at 66° ; the wax from Java coca seems to consist of palmityl- β -amyirin, cerotone, ceryl cerotate, myristyl- β -amyirin, and a substance which the author names hydroxycerotic acid.

Hydroxycerotic acid, $C_{27}H_{54}O_3$, melts at 82° , and dissolves freely in hot alcohol and light petroleum, but is only very sparingly soluble in cold ether.

Cerotolic acid, $C_{27}H_{52}O_2$, is formed when hydroxycerotic acid is heated at 100° with acetic anhydride for eight days; it crystallizes in short prisms, and is moderately easily soluble in cold ether and light petroleum.

Sulphur.—Attention has been drawn by Prof. Schulz (*Berl. klin. Wochenschrift*, 1892, No. 13) to the value of sulphur in certain cases of chlorosis in which iron proves inefficient, and which are not complicated with catarrhal and inflammatory conditions of the digestive tract. The sulphur was used in the form of flowers of sulphur mixed with sugar of milk, as much being taken three times a day as would lie on the point of a knife.

THE PHYSIOLOGICAL ACTION OF THE ACTIVE PRINCIPLES OF URECHITES SUBERECTA.¹

BY RALPH STOCKMAN.

The *Urechites suberecta* belongs to the natural order *Apocynaceæ*, and grows abundantly in Jamaica and other West Indian islands, where it is known as the "Savannah flower" or "yellow-flowered nightshade." It is notoriously poisonous, and is supposed to have been the chief poison used by "Obeah men" in the time of slavery.

Bowrey separated from the leaves two active substances—*Urechitin* and *Urechitoxin*. These are both glucosides, with an intensely bitter taste when in solution; the former is insoluble, the latter slightly soluble in water. Experiments with urechitin showed that it is a very active poison, similar in its general action to digitalin. The isolated frog's heart in "Williams' apparatus" was killed in nine minutes by a solution containing 1 part in 200,000, and in two hours by a solution of 1 in 10,000,000. The blood pressure in rabbits was raised in the early stages of poisoning, and fell in the later stages until the heart stopped beating. Rabbits were much less susceptible to the poison than dogs. Urechitoxin also proved to be a muscle and heart poison, but very much less active than urechitin; neither substance caused contraction of the blood vessels of the frog when locally applied. With regard to the marvellous stories told of the poisonous action of the plant, there is a certain admixture of truth and falsehood: a full lethal dose will be fatal within a few hours or a day or two; a single dose of the poison cannot be so administered as to be fatal after the lapse of days or weeks. On the other hand, if repeated minute doses be given, there seems to be no doubt that an animal or man may remain all the time in apparently good health and then die suddenly. The explanation of the long-delayed action and sudden death in such cases is to be found in the well-known accumulative action of digitalin and similarly acting bodies; the small repeated doses cause an accumulation of the poison in the heart muscle until a stage is reached when the heart is so thoroughly poisoned that death ensues from cardiac failure.

¹ *Laboratory Reports of the Royal College of Physicians, Edinburgh*, Vol. iv; *Medical Chronicle*, February, 1893, p. 330.

It is improbable that *Urechites suberecta* will ever prove to be of value as a cardiac tonic, as it possesses, in a high degree, the objectionable accumulative properties which have been so often remarked in the case of digitalis.

A FALSE KAMALA.¹

BY HENRY G. GREENISH, F.L.S.,

Lecturer on Materia Medica to the Pharmaceutical Society of Great Britain.

Although few drugs are subject to such systematic admixture, accidental or intentional, as kamala, substitutions are comparatively rare. I was therefore attracted by the unusual appearance of five samples of kamala from Bombay (representing a bulk of about $7\frac{1}{2}$ cwt.) that were exhibited on a broker's table a few days ago; the drug was coarser than genuine kamala usually is, not so mobile and evidently of a heterogeneous nature, a dark brown powder adhering to the finger when passed through it. For a second sample of this drug I am indebted to Mr. Moss.

A cursory examination under the microscope showed, amongst much vegetable débris, a number of dark reddish-yellow particles; these, under a higher power, proved to be pollen grains; they are marked with numerous projections, and provided with three pores from which, under the influence of suitable reagents, the pollen tubes can be made to protrude.

The nature of the vegetable débris that accompanies these grains became more evident after warming for a few minutes in dilute (1 per cent.) solution of caustic potash and washing with water. Portions of narrow petals, a bifid style, and other fragments were isolated without difficulty, and enabled me to identify the bulk of the drug as consisting of a coarse powder of safflower florets (*Carthamus tinctorius*). To confirm this, safflower florets were dissected, the parts examined, and compared with fragments separated from the kamala in question.

The pollen grains are identical in shape, appearance and size.

The corolla-limb of the safflower floret is sharply characterized by the secretion tubes which run parallel to the two fibrovascular bundles and between them and the margins; they are usually more or less completely filled with a red-brown mass; the epidermal cells

¹ *Phar. Jour. and Trans.*, March 11, 1893, p. 745.

are mostly long and narrow, with sinuous longitudinal walls (not well seen after the action of caustic potash). These characters can all be recognized and identified in the so-called kamala.

In like manner the syngenesious anthers can be distinguished and identified by the presence of elongated pitted cells, with thickened walls, and by the tissue by which they mutually adhere. Lastly, the epidermal cells of the style develop towards the apex into short hairs; these are also observable.

In addition to the small starch grains derived from the corolla tube of the safflower, the drug contains larger angular grains, isolated or in compact masses, which I have not been able to find in safflower, and also lignified tissues, apparently the pericarp of a small fruit. I have compared these latter with the pericarp of safflower fruits, kindly furnished me by Mr. Holmes and by Mr. Jackson, of Kew; they are not identical.

The presence in the drug of about 16 per cent. of ash, much of which is sand, points to careless collection; numerous acari and small beetles indicate careless preservation. Portions of the bodies of the former insects are especially frequent in the microscopic field.

From these data I conclude that the kamala is carelessly collected and badly preserved safflower, mixed with much extraneous matter, and reduced to coarse powder.

NOTE ON SESAMIN.¹

By JAMES F. TOCHER.

In 1891 the author had given in a paper read to the Society an introductory notice of a crystalline substance which he had isolated from sesame oil (see *Amer. Jour. Phar.*, 1891, p. 142) and to which he gave the name of "sesamin." He now submitted the results of further experiments on the substance. As he had stated in his former paper, sesamin is extracted from sesame oil by means of solvents, such as acetic acid and alcohol. The proportion of solvent may vary according to its nature and strength. The proportion of glacial acetic acid—98 per cent. he originally used—was seven volumes to ten of sesame oil, but he found sesamin to be

¹ *Chemist and Druggist*, February 18, 1893. Abstract of a paper read before the North British Branch of the Pharmaceutical Society.

quite soluble in 90 per cent. acetic acid. The sesamin might be obtained from the separated solvent in the crystalline state by two methods, the better of which consisted in evaporating over a water-bath until the solvent had been removed, saponifying the oil present by means of solution of potash, which had no action on sesamin, and setting aside for a few hours until sesamin has deposited. The supernatant fluid is then removed. The sesamin is repeatedly washed with hot water, and recrystallized from alcohol. This method of purification completely gets rid of the impurities. With the sesamin extracted and purified by this mode he performed six combustions: the results showed that the composition of sesamin is expressed by the formula $C_{18}H_{18}O_5$. At $20^{\circ}C$. 100 grains of alcohol dissolve 0.27 grain sesamin, and 100 grains of boiling alcohol dissolve 8.07 grains. The specific gravity of sesamin was formerly found to be 1.305. The ordinary methods employed to determine the constitution of organic compounds gave no satisfactory results as regards sesamin; the evidence indicated that it did not correspond to any known substance. It had been shown to be devoid of acid or basic properties and, judging from its behavior with alcoholic potash, nitric acid, etc., it might come under the term "neutral resin" or resin anhydride as used by Dragendorff to describe oxygenated bodies (occurring along with resin acids) which were insoluble in alkalis. As he had pointed out in his previous paper, sesamin assumed a green and afterwards a bright-red color in contact with nitro-sulphuric acid. A similar coloration was produced on sesame oil by nitro-sulphuric acid, as pointed out by Behrens—a reaction which no other oil exhibited, so that undoubtedly the cause of the coloration was sesamin. Owing to the minute proportion of sesamin present in the oil (0.4 to 0.6 per cent.) he had not been able to extract a sufficient quantity to make a thorough investigation into its constitution.

MANUFACTURE AND COMPOSITION OF LINSEED CAKE AND MEAL.¹

A paper by Haselhoff, published in the journal named, states that flax is chiefly grown in Germany for the flax; for seed it is almost only grown in Mecklenburg and Königsberg, and the seed is not of

¹ (*Landw. Versuchs-Stat.*, 41, 55-93.) Jour. Chem. Soc., 1893, Abstr. II, 38.

very good quality for the production of oil. The American seed is of about the same quality; the Indian (Bombay) is better, whilst the best seed is that from Russia, especially South Russia. Most of the impurities are removed by sifting; when there remains only 4 per cent. of foreign matter (or even 8 per cent. if the foreign matter consists of oily seeds), the seed is practically pure. With regard to the manufacture of linseed oil, the original method consisted in pounding the seeds. Now there are two methods by which the oil is pressed out; in the one heat is applied to the vessel containing the seeds (either by direct firing or steam); in the other, the seed is directly treated with superheated steam. Another method is to extract with light petroleum. The residue (cake or meal) varies in composition according to the method employed. Thus, whilst the residue from pressed seeds contains about 32-36.4 per cent. of protein and 9-11 per cent. of fat, the residue from extracted seeds contains more proteids (40 per cent.) and less fat (3-4 per cent.). The amount of mucilage also varies; where direct steaming is employed the amount is diminished, and cake so obtained will keep for years without becoming mouldy. This is also the case with cake prepared by the light petroleum method, but this seems to be due, not to the abstraction of mucilage, but to the action of the light petroleum.

For adulteration, not only vegetable substances but also heavy spar, gypsum, chalk and salt are employed; saw-dust has been found. Rape-cake meal may be detected by stirring in water in a glass cylinder and allowing to settle; if any dark particles are visible, rape is probably present. A few drops of aqueous alkali will give an intense yellow color if rape is present. Amygdalin does not seem to be actually injurious, but mustard, corn-cockle, and *Camelina* are said to be injurious, whilst castor oil is poisonous and may cause death. Vegetable impurities can mostly only be detected microscopically and the amounts only approximately estimated. But the amount of fat, and especially of protein, give a good idea as to purity or otherwise. When mineral impurities are present they may be detected by the amount of ash, which generally should not exceed 5 per cent. Cake containing over 14 per cent. of water cannot be considered as pure.

With regard to fat, it should be noted what results are obtained when the substance is (1) not previously dried, (2) when dried for two

hours at 100–105°, and (3) when dried for two hours at 100° in an atmosphere free from oxygen; the results should not differ. The rancidity of the fat is determined (1) after the fat has been so long dried that it no longer has an unpleasant odor, and (2) without previous drying. The first estimation gives a lower result than the second, from loss of volatile fatty acids. The higher the percentage of acid the greater the difference in the two experiments; the estimation of rancidity of linseed residues and in foods generally should therefore be made in the fat from undried substance. The cake and meal were also examined bacteriologically; large numbers of micro-organisms were found, but the results give no indication of the quality of the substance examined, as the nature (injurious or otherwise) of the micro-organisms is not known.

A second paper on the same subject, by F. J. Van Pesch contains the following information: Only very little of the linseed worked in Holland is produced in that country; much is obtained from Russia, but most from India. The composition of samples of cake examined at Wageningen varied as follows: proteids (22–37), fatty matter (6·2–18·5), starchy matter (30), water (11–16), ash (4·5–8·6), and crude fibre (7·3–12·3 per cent.). The average amount of digestible matter (according to Kühn), would therefore be: proteids 26, fatty matter 10·4, and starchy matter 24·3 per cent. The origin of the seed has a great influence on the quality of the cake. According to Voelcker, the Russian seeds contain most albumin; those grown further south contain the most fat. The method for the microscopic examination of linseed was described by Kobus, (*Landw. Jahrb.*, 1884, 120). The chief weeds which occur in linseed are *Polygonum Convolvulus* and *lapathifolium*; rape is very frequent, whilst *Camelina dentata*, *Galium Aparine*, *Thlaspi arvense*, and *Agrostemma Githago* also occur. Less frequent are *Brassica nigra*, *Sinapis arvensis*, *Plantago lanceolata*, *Lolium* and other grasses. Besides these seeds which occur naturally, stalks and sand are sometimes found. In Belgium, rice meal and earth-nut skins are frequently added.

Cake manufactured by the so-called American method, in which the finely-powdered seed is extracted by carbon bisulphide, only contains 3–4 per cent. of fatty matter, and is therefore not used in Holland. The method employed for the examination of cake is as follows: The sample is made to pass through a 5 mm. sieve, and 5

grams stirred in a beaker with 100 cc. of boiling water. Beakers of one size are employed, so that the more or less swelling of the powdered cake and the smaller or greater amount of liquid which separates can be compared. It is also noticed whether the liquid is quite thin or whether it is slimy. With regard to the swelling up, *Camelina* swells considerably more than linseed. Kobus (*loc. cit.*) found that 1 gram of linseed kept in water for one hour weighed 2.7-2.8 grams, whilst 1 gram of *Camelina* weighed 4.4 grams after the same treatment. A part of the liquid is tested with iodine for starch; only a light blue color should be produced. The residue obtained when the water is poured off is examined microscopically (Kobus, *loc. cit.*). The number of foreign particles is estimated in 5 grams, the separation being effected by a jet of water on the substance in a 1.2 mm. sieve. Determinations of proteids, fat, and ash are also made.

The injurious substances sometimes found in linseed cake are corn-cockle, containing a poisonous substance, saponin or githagin, the seeds of *Thlaspi arvense*, which, when eaten by cows, impart a garlic-like taste in the milk, the hemp seed, which causes diarrhœa. Barium sulphate is objectionable, whilst salt, besides being good for cattle, has the advantage of making the cake softer; on the other hand, the cake becomes quickly moist and therefore spoilt. The poisonous action of castor oil beans was first shown by van den Berghe. Other substances doubtless occur which are more or less poisonous or injurious when much of them is present.

The results of experiments made at Wageningen show that in 5 grams of substance it requires only 16 seeds of *Polygonum lapathifolium*, 13 of *P. Convol.*, 4 of *Galium Aparine*, and 46 of *Camelina* to make 1 per cent. of the cake. Each seed is reckoned as follows: *Camelina* 2, *Polygonum lap.* 6, *P. Convol.* 8, *Galium Aparine* 25; if the sum of the numbers found exceeds 100, the cake is not pure enough.

In most cases it is sufficient to magnify 70-80 times, but in some cases 300 times. For the detection of very finely-powdered substances in cake, a test tube is half filled with the powdered cake, treated with alcohol, well shaken, and allowed to settle; the alcohol is poured off and some of the fine meal which floats on it put on an object glass. The alcohol is evaporated, a drop of glycerol and aqueous soda added and pressed with a second glass. When

magnified 300 times, earth-nut meal is readily distinguished; it is seen as ring-shaped depressions. Other substances than earth-nut meal can only be detected by special methods.

A METHOD FOR PRESERVING SPIRITUS ÆTHERIS NITROSI.¹

BY A. MELDRUM.

With the object of ascertaining the effects of light and heat on the composition of the spirit, and whether the addition of glycerin would have any influence, beneficial or otherwise, on the chemical changes which took place during the storage of it, the writer had made a number of experiments. A strong spirit of nitrous ether was made by the pharmacopœial process. One part of it was diluted with rectified spirit, as directed in the Pharmacopœia; a second part with rectified spirit and glycerin, so that the finished product contained 5 per cent. by volume of glycerin; and a third part with rectified spirit and glycerin, so that the finished product contained 10 per cent. of the latter. The various samples were exposed to different temperatures and degrees of light for a month, and then examined for NO gas by Allen's process, for aldehyde by Thresh's method, for free nitrous acid, for free acetic acid, and for total free acidity—the last three having been examined by the method described by Mr. Peter MacEwan, but substituting alcoholic for aqueous solution of soda. To eliminate the influence of light when the effect of temperature was registered, three sets of samples were kept in the dark, one at a temperature averaging 35° F., another at temperature 55° to 60°, and a third at from 70° to 75°. To eliminate the influence of temperature when the results of exposure to light were wanted, one set was kept in the dark, a second was exposed to diffuse daylight, and a third to direct daylight, the temperature in every case having been the same, viz: from 55° to 60°. The results, which were detailed in tabulated form, showed that the effect of increased temperature tended to cause, first, loss of ethyl nitrite; second, slight diminution of the aldehyde; third, increase of free nitrous acid; fourth, increase of acetic acid; and, fifth, consequent

¹ *Chemist and Druggist*, February 18, 1893. Abstract of a paper read at Edinburgh, February 15, before the North British Branch of the Pharmaceutical Society.

increase of total free acidity. Five per cent. of glycerin tended to diminish the loss of ethyl nitrite, and retarded the formation of aldehyde and free acids, while the addition of 10 per cent. prevented, in great measure, the loss of ethyl nitrite, retarded the formation of acetic acid and total acidity, and reduced the percentage of aldehyde and nitrous acid as temperature increased. The effect of light was to cause loss of ethyl nitrite, and increase of nitrous acid, free acetic acid, and total acidity. The addition of glycerin had results similar to those attending its use in temperature tests. On the whole, the writer stated, the addition of glycerin at least in a proportion of 10 per cent. by volume is favorable to the keeping of the spirit without entailing much trouble. The solution of pure ethyl nitrite in absolute alcohol, although not liable to alteration, does not seem to have come into general use—possibly on account of the price, or, as suggested by Professor Leech, on account of the large proportion of alcohol it contained, which might be undesirable in some cases. On the other hand, the addition of glycerin to sweet spirit of nitre, while tending to preserve it, would not alter its characteristic taste or smell to any appreciable extent, and, if adopted, it might obviate the necessity of introducing the more expensive solution of ethyl nitrite in glycerin and the absolute alcohol. Experiments had also been made to show the effect of stoppering, and the results of badly-fitting stoppers were loss of ethyl nitrite, loss of aldehyde, increase of free nitrous acid, and decrease of acetic acid and total acidity.

MINUTE OF COLLEGE MEETING.

PHILADELPHIA, March 27, 1893.

The annual meeting of members of the College was held this day in the museum of the new building, Charles Bullock presided. Mr. Bullock, in calling the meeting to business, referred in appropriate words to the fact that this was the first assemblage of members for this purpose held in this room; that the occasion was suggestive of reflection and thought, and marked an important era in the growth and extension of this institution—the conspicuous representative in our country of similar institutions; that the College had now advanced in all its appointments to an entitled position and rank, and that a consciousness of this should awaken new zeal and interest in maintaining its deserved prominence and usefulness. The minute of the previous meeting was read and by resolution adopted. The minutes of the meetings of the Board of Trustees for January, February and March were presented, and on motion approved. This occasion being that of the annual meeting the follow-

ing reports were submitted and directed to be entered in extenso upon the minutes. The Committee on Publication reported the prompt and regular issuance of the American Journal of Pharmacy, and stated that its status in the literature of the science was fully and ably maintained. The Editor of the Journal in presenting his report states that the progress of rebuilding which had been entered upon proved an interruption to much of the investigating and research work of the laboratories, but an increased interest will assuredly be an outgrowth of the additions and facilities now offered, and still more satisfactory results may be expected for the future from the Pharmaceutical Meetings in developing new topics of inquiry.

Detailed statements of the Business Editor and the Treasurer of the Publication Committee were made and ordered to be extended upon the minutes. The Librarian in report submitted states that the volumes are being re-labelled, arranged and catalogued on the shelves of the new library cases, and that this work will be diligently prosecuted to completion. The Curator reported the cabinets and cases of specimens as being in good order and system. Also that quite a number of specimens and additions had been made to the collections, suggesting that modifications for space and arrangement could be judiciously added.

Prof. Remington spoke of the labor which had devolved upon the Curator, and expressed for himself and on behalf of his fellow-members a grateful appreciation.

Prof. Maisch reported from the Board of Trustees the following propositions for honorary membership, with the favorable recommendation of the Board: Alfred H. Allen, F.I.C., F.C.S., Sheffield, England; Prof. Dr. Friedrich Conrad Beilstein, St. Petersburg, Russia; Prof. Dr. Emil Fischer, Berlin, Germany; Prof. Dr. Carl Remigius Fresenius, Wiesbaden, Germany; Thomas B. Groves, F.C.S., Weymouth, England; Prof. Dr. Edouard Heckel, Marseille, France; David Hooper, Quinologist, Ootacamund, India; Prof. Dr. Oscar Liebreich, Berlin, Germany; Prof. Dr. Christian Luerssen, Königsberg, Germany; Prof. Dr. Demetrius Mendelejeff, St. Petersburg, Russia; Prof. Dr. Victor Meyer, Heidelberg, Germany; Dr. Ferdinand von Mueller, Melbourne, Australia; W. S. W. Ruschenberger, M.D., U.S.N., Philadelphia; Prof. Frédéric Schlagdenhauffen, Nancy, France; Prof. Dr. Ernst Albert Schmidt, Marburg, Germany; Prof. Dr. Junichiro Shimoyama, Tokio, Japan; Prof. Dr. Wilhelm Oswald Alexander Tschirch, Bern, Switzerland; Charles Umney, F.I.C., F.C.S., London, England; Prof. Dr. Emil Vogl, Vienna, Austria; Prof. Horatio C. Wood, M.D., Philadelphia.

On motion, the report was received, and the nominees were unanimously elected.

The same disposition was made of the following recommended in like manner for election as Corresponding Members of the College: Prof. Dr. Heinrich Beckurts, Braunschweig, Germany; F. Baden Bengel, F.I.C., F.C.S., Manchester, England; Ernst Biltz, Erfurt, Germany; H. Bocquillon-Limousin, Paris, France; Prof. Dr. Albert Hilger, München, Germany; Prof. Dr. Theodor Husemann, Göttingen, Germany; Prof. Dr. Eduard Rudolf Kobert, Dorpat, Russia; Prof. Dr. Carl Liebermann, Charlottenburg, Germany; Karl F. Mandelin, Wasa, Finland, Russia; William Martindale, F.C.S., London, England; Helen Abbott Michael, Torwood, Isle of Wight; Chas. Theodor

Mohr, Mobile, Ala., U.S.A.; Prof. Louis Planchon, Montpellier, France; Jacobus Polak, Amsterdam, Holland; Prof. Dr. Th. Sandahl, Stockholm, Sweden; Prof. Dr. O. Schmiedeberg, Strassburg, Germany; Prof. Henry A. Tilden, Birmingham, England; Prof. Dr. Bernhard Tollens, Göttingen, Germany; L. Van Itallie, Rotterdam, Holland; Dr. G. Vulpius, Heidelberg, Germany; Prof. Dr. Otto Wallach, Göttingen, Germany; Dr. C. R. Alder Wright, F.R.S., London, England.

The following officers and trustees of the College were also elected by ballot:
President—Charles Bullock.

First Vice-President—Robt. Shoemaker.

Second Vice-President—William J. Jenks.

Treasurer—William B. Webb.

Corresponding Secretary—Dr. A. W. Miller.

Recording Secretary—William B. Thompson.

Librarian—Thos. S. Wiegand.

Curator—Jos. W. England.

Committee on Publication—Henry A. Rittenhouse, Chas. Bullock, James T. Shinn, Thos. S. Wiegand and the Editor.

Editor—John M. Maisch.

Trustees for 3 years, next ensuing—T. Morris Perot, Jos. P. Remington, James T. Shinn.

On motion, meeting adjourned.

WILLIAM B. THOMPSON,
Secretary.

MINUTES OF THE PHARMACEUTICAL MEETING.

MARCH 21, 1893.

On motion of Dr. Lowe, Mr. Wm. McIntyre was called to the chair. The minutes of the last meeting were read and approved.

The registrar presented, on behalf of Mr. Hans M. Wilder, the following books for the library: Sternberg, Geo. M., Photo-micrographs and how to make them, 1883; Krukenberg, C. Fr. W., Medicinisch-chemische Analyse, 1884; Funke, Otto, Atlas der physiologischen Chemie, 1858; Pharmacopœia of the Hospital of the University of Pennsylvania, 1874; Official Formulæ of American Hospitals, 2d edition, 1886; Stammer, Karl, Chemische Rechnungs-Aufgaben, 1878; Warnecke, T. S., Supplementum Pharmacopœiæ Danicæ, 1869; New York and Brooklyn Formulary, 1884; Bruckner, W. H., American Manures, 1872; Mohr, Fr., Weinbau, 1865; Frickhinger, Albert, Katechismus der Stœchiometrie, 1865; Flückiger, F. A., Documente zur Geschichte der Pharmacie, 1876; Boeke, J. D., Sammlung stœchiometrischer Aufgaben, 1882; Icones plantarum. A rare book. Without title nor end, and with copious English manuscript notes. The handwriting is from the time of James the First. The book itself appears to be French.

On motion the registrar was directed to return the thanks of the College for this gift.

Dr. Lowe exhibited a *new form of still*, put on the market by Mr. Henry J. Maris; it consists of a rather flat copper vessel with a head attached by means of a slip joint, the head is conical and surrounded on the sides with a rim; the refrigeration is effected by a current of water which strikes the apex of the

cone and thus keeps, what otherwise would be the hottest point, cool; the material to be distilled is fed by a tube from a container supported above it, and another tube permits air to rise from the still head to the container until the lower surface of the tube is covered. It was asked if such a still was suitable for ethereal distillations as what is termed a water joint is not generally tight enough for such purpose; it was explained that in future a pair of flanges and gum washers clamped together would be used.

A *spatula of steel*, covered with hard rubber, was exhibited. A doubt was expressed as to whether the expansion of the two substances was not so different as to cause the rubber to break away from the steel. It was stated that great care should be taken for fear of such a flaw occurring and thus introducing a poisonous substance into some other mixture intended for quite a different purpose, as happened recently when veratrine, which was retained by a crevice in a mortar, was introduced into a mixture, although the mortar had been carefully washed with alcohol, and afterwards with a cloth and hot water; the proper method is never to use a mortar for such articles, and for remedies intended for internal use. The discussion brought out the better method of preparing veratrine ointment by mixing the alkaloid with either a small quantity of oil or glycerin.

Professor Trimble read a paper, prepared jointly by him and Mr. J. C. Peacock, upon *Canaigre tannin*—a product from *Rumex hymenosepalus*. In reply to various questions, Prof. Trimble said that Prof. C. B. Collingwood, of Arizona, has written somewhat about canaigre, and stated the yield in poor soil to be as much as seven tons to the acre, and when properly cultivated, twenty tons; a sandy soil seems to be best adapted to its growth. The tannin is precipitated by neutral salt; but this process is wasteful, as the tannin seems to be largely decomposed. It is intended to be used for dyeing purposes and not as a remedial agent. The crude drug has been used in the chipped state; it is peculiar in that the roots contain 18 to 20 per cent. of starch, and is, therefore, much more difficult to work with, but this has been overcome in some way by the manufacturers of the extract, which they keep to themselves.

Mr. England asked for the formula for *Pravaz's hemostatic Solution of Iron*. Prof. Maisch said that the strength of this solution was given in Dorvault's *L'Officine*; it consists of 26 per cent. of anhydrous ferric chloride and 74 per cent. of water, and has a density of 30° Beaumé.

Mr. England exhibited a mass of *hair* taken from the stomach of a cow. Butchers state that such things are quite often found, sometimes also associated with particles of gravel.

On motion, adjourned.

T. S. WIEGAND, Registrar.

EDITORIAL.

Amendment to the Pennsylvania Pharmacy Law.—In our two preceding issues, we have kept our readers advised of the progress made in the State Legislature, with the bill repealing Section 11 of the Pharmacy Law of 1887. We are pleased to state that the bill passed the Senate finally, March 9, by a vote of 35 and no negative votes, and that it became a law March 14, when

Governor Pattison promptly affixed his signature. The following is a copy of the law :

AN ACT

To repeal section eleven of an act entitled "An act to regulate the practice of pharmacy and sale of poisons, and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania," approved the twenty-fourth day of May, Anno Domini one thousand eight hundred and eighty-seven.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same:* That section eleven of an Act entitled "An act to regulate the practice of pharmacy and sale of poisons and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania," approved the twenty-fourth day of May, Anno Domini one thousand eight hundred and eighty-seven, which reads as follows :

"Any graduate of an accredited medical college, who has had not less than three years' continuous practice since the date of his diploma, and who is registered as a practitioner of medicine and surgery under the act entitled 'An act to provide for the registration of all practitioners of medicine and surgery,' approved the eighth day of June, Anno Domini one thousand eight hundred and eighty-one, may be registered under this act without examination and be granted a certificate which shall entitle him to conduct and carry on the retail drug or apothecary business as proprietor or manager thereof, subject to fees provided in sections three and four of this act," be and the same is hereby repealed.

The Kansas School of Pharmacy has, since its establishment, been housed in the Chemistry Building of the State University, where it was insufficiently provided with room. When the last Legislature met, evidence was submitted showing the inadequate facilities for good work, and requests for a new building were made by the faculty of the school and by the druggists of the State. A bill was introduced into the House, appropriating \$20,000 for an addition to the building in which the school is now located; it passed the House with but little trouble, but when it reached the Senate the measure was promptly defeated, and thus the school continues to be crippled in its work, through a mistaken sense of economy on the part of the law-makers. The money granted to such an institution should not be regarded a gift, but properly used is a loan, that will be amply repaid and with interest by increasing the efficiency of pharmacists, whose standard of qualification cannot be raised too high, in view of the important relations to the public.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Proceedings of State Pharmaceutical Associations :

The following issues have been recently received :

Indiana.—Eleventh annual meeting, held in Indianapolis, May 11 and 12, 1892. Pp. 104. See July number, 1892, of this journal, p. 383. F. W. Meisner, Jr., La Porte, secretary.

Iowa.—Thirteenth annual meeting, at Davenport, June 14-16, 1892. Pp. 117. See our September number, p. 498. Dr. Rosa Upson, Marshalltown, permanent secretary.

Michigan.—Tenth annual meeting, at Grand Rapids, August 2-4, 1892. Pp. 88. See September number, p. 499. The next meeting will be held in June, at one of the resorts along the St. Clair River, the exact date and place to be announced later. Chas. W. Parsons, secretary. James Vernon, local secretary.

Missouri.—Fourteenth annual meeting, at Excelsior Springs, June 14-17, 1892. Pp. 167. See September number, p. 499. Next meeting at the same place, June 13-16, 1893. Dr. H. M. Whelpley, secretary; C. L. Cravens, Excelsior Springs, local secretary.

North Dakota.—Seventh annual meeting, at Fargo, August 2-4, 1892. Pp. 27. Also Report of the Secretary of the North Dakota State Board of Pharmacy. Pp. 18. A brief account of the meeting will be found on p. 547 of our last volume. Next meeting at Fargo, August 8-10, 1893. L. Christianson, secretary.

Ohio.—Fourteenth annual meeting, at Canton, June 14-16, 1892. Pp. 101. See July number, last volume, p. 384. As frontispiece the portraits of two deceased ex-presidents are published, J. F. Judge, formerly of Cincinnati, and I. N. Reed, late of Toledo. The next meeting is announced to be at Findlay, on the first Tuesday of May, 1893; J. C. Firnine, local secretary; Lewis C. Hopp, Cleveland, permanent secretary.

Virginia.—Eleventh annual meeting, at Petersburg, October 11-13, 1892. Pp. 104. The pamphlet has as frontispiece the portrait of Wm. A. Strother, a prominent druggist at Lynchburg, who died in that city August 1, last, in the sixtieth year of his age. The Association will hold its next meeting at Blue Ridge Springs, commencing September 12, next. The officers are F. W. Wills, Charlottesville, president; C. B. Fleet, Lynchburg, secretary; C. H. Lumsden, Lynchburg, treasurer; S. P. Christian, Jr., Roanoke, local secretary.

Manuale di Chimica Tossicologica, pel Professor Dioscoride Vitali, Professore di Chimica farmaceutica e tossicologica nella R. Università di Bologna. Milano: Tipografia del Riformatorio Patronato. 1893. 8vo. Pp. 524.

Manual of toxicological chemistry.

In the preliminary portion to this work the author gives upon more than two closely printed pages the titles of works, monographs and periodicals consulted by him, showing that he has endeavored to avail himself of the researches of all civilized countries. The prefatory chapter explains the object of the work and shows the importance of toxicology as a science, related to therapeutics, physiology and pathological anatomy, as well as to analytical chemistry, of which chemical toxicology forms a most important branch, to which this manual is especially devoted. The work proper is divided into four parts, of which the first treats of poisons in general, their absorption, the changes they undergo in the body, their localization and elimination, first aids in cases of poisoning, the chemical antidotes, the duties of the chemical expert under the laws of Italy, and the classification of the poisons into groups, according to their toxic action. The second part is taken up with the metallic poisons, arsenic, antimony, tin, copper, lead, zinc, mercury and silver,

the largest space, about 27 pages, being required for the arsenical compounds. From French statistics quoted by the author it is of interest to note that during the three decades commencing 1845, not only has the total number of cases of poisoning decreased, but the proportion of arsenical poisoning has decreased to a still greater extent, showing that other agents are now more largely made use of, proportionately, for the destruction of human life. During the three decades the cases of arsenical poisoning were 68.5, 27.7 and 18.5 per cent., respectively, as compared with the total number. Part III discusses in two sections the poisonous gases (CO , CO_2 , H_2S , SO_2 , Cl , HCl , NH_3 and allied compounds) and volatile elements and compounds, like bromine, iodine, cyanides, chloroform, chloral, benzol, phosphorus, the mineral acids, etc. In Part IV, we find in the first section the common organic acids considered, together with the caustic fixed alkalies and their compounds and barium, while the second section is reserved for other, mostly non-volatile organic compounds, among which there are many that are not likely to be used for criminal poisoning, such as nitroglycerin, resorcin, santonin, cantharidin, picrotoxin, digitalin, helleborein, saponin, aloin, colocynthin and the resins of jalap and scammony. This second section closes with the most important portion of the work which, in over two hundred pages, is devoted to the alkaloids, of which about one-sixth is occupied by general considerations, the toxic action, absorption, diffusion, localization and elimination; the difficulties encountered by the toxicological chemist; the physico-chemical characters of the alkaloids; the group reagents, color reactions, micro-chemical recognition and the isolation of the alkaloids from the material and their quantitative determination. In the special part we meet with a large number of alkaloids, embracing not only those usually recognized by the pharmacopœias, but also such as are rather rarely seen and not frequently used in medicine, like lobeline, quebrachine, gelsemine, the pomegranate alkaloids, taxine, ergot constituents, muscarine and poisonous fungi, the artificial alkaloids (aniline, kairine, thalline, antipyrine), and finally the ptomaines. An appendix contains descriptions of the processes recommended by different authors, for the isolation of poisons, when the nature of the latter is not known; also some additions to various chapters, which became known while the work passed through the press, among them a process elaborated by Prof. Vitali, for the quantitative determination of small quantities of arsenic.

It will be seen from the foregoing that Prof. Vitali's manual covers the ground of toxicological chemistry very thoroughly, and more comprehensively than is done by other similar works. In his endeavor to give the latest information, the author has not only availed himself of the literature of the different countries, but has also made many experiments and researches, the results of which are scattered through the work. A comprehensive and reliable work is thus produced, which will be consulted with profit by those interested in the important subject of which it deals.

Further Studies of Yuccas and their publication. By Wm. Trelease. Pp. 46.

A continuation of the author's work, noticed in our preceding volume. The essay is a reprint from the fourth annual report of the Missouri Botanical Garden, and is illustrated by 23 plates, mostly phototypes of different species of *Yucca* and fruit.

OBITUARY.

Francis Wolle, a Moravian minister and educator, died at Bethlehem, Pa., February 10, aged 75 years. He was born at Nazareth, Pa., and educated at Nazareth Hall and at Bethlehem. He was the originator of a machine for the manufacture of paper bags, first patented in 1852, and for twenty years was principal of the Moravian seminary for young ladies at Bethlehem. His love for natural history led him finally to the study of low vegetable organisms, resulting in the publication, since 1884, of four large illustrated volumes on desmids, fresh water algæ and diatomaceæ, which established his reputation as a scientist and as an authority in this special field.

George Vasey, M.D., botanist at the Department of Agriculture, died in Washington, D. C., March 4, at the age of seventy-one years, of constriction of the bowels. Born at Scarborough, Yorkshire, England, February 28, 1822, he came with his parents to America, when a child, received his medical education at the Berkshire Medical College, Pittsfield, Mass., where he graduated in 1848, and afterward practised medicine in Illinois, until in April, 1872, he was appointed botanist to the Department of Agriculture at the seat of the National Government. The accumulation and arrangement of the National herbarium, comprising over 25,000 species of plant, is largely due to his untiring efforts. His chief work was upon grasses, with the purpose, as he stated in his annual report for 1886, "of bringing to view and into cultivation new kinds which might prove useful additions to the agriculture of the country. . . . In a country so extensive as ours, embracing such a variety of soil, surface and climate, it cannot be expected that any one kind of grass will be adapted to cultivation in all situations. . . . Particularly in the arid regions of the West new kinds of grasses are needed, adapted to the peculiar conditions there existing." A number of botanical pamphlets and monographs, of which he was the author, or which were prepared under his supervision, have been issued by the Department, and several were noticed in previous volumes of this journal.

Carl Prantl, professor of botany at the University of Breslau, died February 24, after prolonged illness, of pulmonary disease. He was born September 10, 1849, in Munich, where his father was professor at the University, and where he received his scientific education, and graduated after especially studying botany under Professors Naegeli and Radlkofer. In 1870, his essay on "inulin, a contribution to vegetable physiology," was awarded the prize of the philosophic faculty of the University named. In 1873, he became connected, as private lecturer, with the University of Wurzburg, and in the following year published his manual on Botany, of which the eighth edition appeared in 1891. He accepted, in 1876, a call as professor of botany to the College of Forestry at Aschaffenburg, and in 1890 succeeded Engler at Breslau. A *Flora of Bavaria* was published by him in 1884, and he was the author of numerous essays, relating to morphological, physiological and systematic botany; perhaps his most important literary labor was in connection with "*Natürliche Pflanzenfamilien*" (natural plant families), of which he was the joint editor, with his friend Engler, and for which he elaborated several phænogamous orders; the text for the cryptogams, and more particularly for the ferns, which

Prantl had specially reserved for himself, remains unfinished, in consequence of his untimely death at the age of forty-three years.

Rudolf John Christian Brunnengraeber died at Rostock, Germany, February 19, in the sixty-first year of his age. He was born in Schwerin, May 19, 1832, and after attending there the classical school (Gymnasium) until 1849, became an apprentice in pharmacy in Berlin, where he subsequently continued his studies at the University to prepare for the State's examination, which he passed at the University of Rostock, at which institution he afterward, in 1862, graduated as Ph.D. In the same city he became the proprietor of a pharmacy in 1859 and combined with the business the manufacture of various chemicals. He took a most prominent part in pharmaceutical affairs in Germany and in the welfare of the National Apothecaries' Society, of which he became one of the directors in 1869 and continued in that position until the time of his death, serving as president from 1878 until 1891. For thirteen years he was a member of the Board of Health of the German empire, and he served in many other positions of honor, trust and responsibility. He was first vice-president at the fifth International Pharmaceutical Congress, held in London in 1881, and in the following year he was elected an honorary member of the American Pharmaceutical Association.

Isaac J. Martin, Ph.G., M.D., died at Ellicott City, Md., December 15, 1892, in the seventy-eighth year of his age. He was born of Quaker parents at Port Elizabeth, N. J., September 15, 1815, and after the death of his parents was raised by relatives in Philadelphia. In 1832, he was apprenticed to Edward B. Garrigues, then in business at Sixth and Spring Garden Streets. He graduated from the Philadelphia College of Pharmacy in 1835, and took his preceptor's store in 1837. Owing to poor health he moved to Maryland in 1841, conducted for some time a seminary in Harford County, studied medicine, and in 1849 located at Ellicott's Mills, now Ellicott City, where for a short time he taught school, but in 1850 opened the drug store with which he was connected to the time of his death, and which is now conducted by his sons. Dr. Martin, in 1843, became a member of the Methodist Episcopal Church, and several years later was licensed to preach.

James C. Craven died at his home in Philadelphia, March 25, after a long illness. He was born and educated in Philadelphia, learned the drug business with Bullock & Crenshaw, and graduated in pharmacy in 1869. He then determined to prepare himself for the ministry, studied at the University of Pennsylvania and at the Protestant Episcopal Divinity School, and was ordained in 1875. Subsequently he was called to rectorships of churches in Providence, R. I., Dubuque, Ia., and Jenkintown, Pa., resigning the latter position last August on account of his health.

Isaac Tull, a native of Philadelphia, graduated in pharmacy in 1872, and afterward conducted a store at Fortieth and Locust Streets. Some years ago he removed to Morgantown, N. C., where he carried on the drug and apothecary business until the time of his death, which took place, of meningitis, December 22, 1892, the deceased being in the forty-second year of his age.